SPECIES AND HABITAT: AQUATIC

Characterization

The upper part of the South Fork Coos Watershed consists of Tioga Creek and Williams River and several major tributaries. Tioga Creek is a deeply entrenched stream that combines with the Williams River to form the South Fork Coos River. Tioga Creek and Williams River are rugged and deeply carved by steep, highly confined and entrenched tributary channels. The area receives 70 inches of precipitation annually, most of which falls in the winter months. Little groundwater storage results in streams that have a flashy response to precipitation events.

The lower portions of Tioga Creek and Williams River, as well as the major tributaries, contain or have the greatest potential for, an abundance of fish habitat found in the Watershed. Anadromous fish species primarily utilize the lower reaches of the tributaries, while resident cutthroat trout occupy habitat in the upper reaches of tributary streams.

Daniels Creek and the lower South Fork Coos River below McKnight Creek are characterized by unconstrained valley bottoms with wide flood plains, a unique feature when compared with the remainder of the analysis area. This occurs due to tidal influence from the Coos Bay estuary in combination with the low gradient nature of the landform. Tidal influence extends into the low quarter mile of Daniels Creek and as far up as McKnight Creek on the South Fork Coos River (9 miles upriver from Millicoma River junction). The low gradient reaches continue above the head of tide for about 3 miles on Daniels Creek and about 14 miles on the South Fork Coos River[1]. These estuarine and lowland streams provide important reproduction and rearing habitats for a variety of fish, amphibians, invertebrates, birds and mammals (USDA 1985).

The remainder of the streams in this Watershed generally either have narrow flood plains or are constrained by steep hill slopes. Overall these streams provide reproduction and rearing habitats for fewer species than the lower Watershed.

The headwall streams are Rosgen type A streams. Their gradients are generally too steep, and hillslope processes are too active for most of them to provide fish habitat. Resident cutthroat trout may inhabit the more suitable reaches. Some tributary Rosgen type B stream reaches may be cutthroat trout only streams. Populations are usually kept separate from anadromous fish by natural physical barriers. Valley bottom streams are Rosgen type B and C channels. These channels and the aquatic habitats they contain are influenced by hillslope and riparian processes that supply gravel and large wood to the streams.

Native fish species:

chinook salmon	threespine stickleback	Pacific lamprey
coho salmon	redside shiner	western brook lamprey
chum salmon	speckled dace	prickly sculpin
steelhead trout	longnose (Millicoma) dace	reticulate sculpin
resident & sea-run cutthroat trout	largescale sucker	

[1] Head of tide on Daniels Creek is the south line of section 35, T.25 S., R.12W. Head of tide on the South Fork Coos is river mile 10.2 in section 27, T.25S., R.11W. (State of Oregon Division of State Lands, 1989)

Mollusks: Currently, there are approximately 350 species of mollusks known to occur in forests within the range of the northern spotted owl (FEMAT 1993). Over 100 species have been identified to be associated with late-successional forests. These include aquatic and land snails and slugs. The range of many of these species is unknown. Many of the aquatic mollusks are associated with small springs and seeps that were not recorded in past inventories. These habitats can be associated with cliffs, talus, or seeps at the interface of geologic formations.

Other aquatic dependent species in the Watershed include macro-invertebrates, and amphibians. The nonnative fish species known to reside in the Watershed are the American shad and the striped bass.

Aquatic habitat restoration efforts on public lands have been ongoing since the 1960's and continue today. Restoration on private land has recently occurred through cooperative efforts initiated by the Coos Watershed Association. The retention of spawning gravel and creating cover in pool habitats are prime objectives. These features provide fish and other aquatic life with food, cover and reproductive habitats.

Current Condition

Table Fish-1 summarizes the ODFW stream habitat survey data. These surveys are used to identify habitat protection and restoration opportunities. By using individual reach data, restoration plans are developed based on the presence or absence of certain habitat components like large wood, pools, and shade. No ODFW stream survey data exists for Burma and Farrin Creeks. There also is no current data for the mainstem South Fork Coos River below Tioga Creek. However, habitat degradation over this entire reach is primarily the result of splash dam operations, which simplified the river with regards to habitat. Bedrock glides with interspersed boulder/cobble riffles are the dominant river bed features. The river has little large wood, few gravel bars and little channel complexity. Hardwoods (red alder, myrtle and maple) dominate the riparian areas. Conifers, which with few exceptions are less than 70-years old, dominate the upslope areas within 200' of the river. Streamside roads and roads crossing streams can cause the following problems:

- Culverts not specifically designed and installed to facilitate the movement of fish and aquatic amphibians can prevent upstream migration of those species, and can deny the use of tributaries as refuges during periods of high flow.
- Roads crossing streams can be barriers that stop landslide material from being distributed downstream. This prevents the low gradient streams from recruiting gravels, cobbles, and coarse woody debris from high gradient streams and headwall areas (Jones et al, 2000).
- Moderately and heavily used dirt and gravel roads, and roads with unvegetated cutslopes and ditches, which are either next to or are connected to streams, are sources of fine sediments entering the stream (Sidle 1980; USDI 1997).

Table Fish-1. Current Condition of Stream Habitats of Selected Tributaries in the Lower South Fork Coos River.

Stream Name (Survey date) Reach No.	Large Wood (pieces per 100m)	Pool Area (%)	Pool Frequency (channel widths)	Percent Gravels in Riffles	Percent Fines	Riparian Vegetation	Shade	BLM Land	No. of Culvert Crossings
Daniels Ck (1994)									
Reach 1	3.2	70	35	15	73	grass/shrub	46	20 acres	3
Reach 2	6.5	5	103	20	27	hardwood	76	none	3
Morgan Ck (1994)									
Reach 1	0.8	58	27	41	49	hardwood/grass	60	none	1
Reach 2	17.1	14	49	26	25	young/2nd conifer	89	none	0
Ren Smith Ck (1994)									
Reach 1	9.7	53	29	21	75	young hardwoods	82	¼ mi.	0
Reach 2	22.8	42	54	16	45	hardwoods	91	all	2
Cox Ck (1997)									
Reach 1	35.6	32	5	42	18	mixed	86	majority	0
Reach 2	31.1	35	9	37	24	hardwoods	81	all	2
Reach 3	38.1	51	8	62	32	hardwoods	89	all	1
Reach 4	10.2	1	234	40	11	hardwoods	93	all	0
Tributary A									
Reach 1	9.1	1	283	50	7	hardwoods	72	all	0
Coal Ck (1997)									
Reach 1	14	23	12	42	15	hardwoods	92	upper 20%	0
Reach 2	27	14	23	47	20	hardwoods	89	all	0
Mink Ck (1995 ODFW)									
Reach 1	6.9	16	5.4	26	18	2nd growth	99	upper 3rd	0
Reach 2	12.1	23	4.2	40	25	old-growth/ young	89	all	0
Reach 3	8.5	0	0	34	31	mature timber	99	lower 5th	0
Panther Ck (1993)									
Reach 1	5	21	unknown	20	20	young	70	upper 3rd	0
Reach 2	41.4	30	unknown	20	27	old growth	78	all	1(?)
Arrow Trib. (1993)									
Reach 1	8.3	41	unknown	no riffles		mixed	78	none	1
Reach 2	23	44	unknown	45	33	mixed	69	none	0
Reach 3	17.4	39	unknown	no riffles		young conifer	64	none	0
Reach 4	26.5	13	unknown	25	34	mixed	78	all	0

Using Table Fish-1 values, we can give streams an overall condition rating using the following ODFW standards:

Characteristic	Excellent	Good	Fair	Poor
Large Wood Debris (pieces /100m)	>30	20-29	11-19	<10
Pool Area (%)	>45	30-44	16-29	<15
Pool Frequency	<8	8-10	11-20	>20
% Gravel in Riffles	>80	30-79	16-29	<15
% Fines	<1	2-7	8-14	>15
Shade	>80	71-79	61-70	<60

Based on these ODFW standards, the overall condition ratings, for recently the surveyed South Fork Coos River tributaries, are as follows:

Tributary Name	Condition
Daniels Creek	poor
Morgan Creek	fair
Ren Smith Creek	good
Cox Creek	good
Coal Creek	good
Mink Creek	fair
Arrow Creek Tributary	fair
Panther Creek (Reach ?)	fair/good

Fish runs within the South Fork Coos Watershed vary among species. Hatchery operations have supplemented Chinook runs since splash dams were removed. Chinook runs are strong in Daniels Creek and Tioga Creek.

We have approximately 13 miles of roads within 200' of stream channels (see Table ACS-3 in the Aquatic Conservation Strategy Objectives chapter for total road miles by slope position), and 116 culvert crossings on second order or larger streams on BLM land within the Watershed. Roads are primarily asphalt or gravel surface and have gradients of less than 15%. Large woody debris is potentially deficient in the streamside stands next to roads due to road side salvage operations.

Special Status Species: Coho runs within the Watershed have followed the same fluctuating patterns as other Coastal stocks in that they showed good numbers before 1996 and declining numbers in 1997. Forecasting future run sizes is difficult because coho operate on 3-year cycles, and ocean and precipitation patterns are constantly changing. On August 10, 1998, NMFS published their final rule on the Oregon Coast Evolutionarily Significant Unit (ESU) of coast coho salmon in the Federal Register (Vol. 63, No. 153, pg. 42587-42591). NMFS found the Oregon Coast ESU to warrant listing as a threatened species. This listing pertains to naturally spawned populations of coho salmon only.

At the time we prepared this analysis, steelhead and sea-run cutthroat trout were listed as “candidate” species. For current status of these species see the NMFS Northwest Regional Office home page (< http://www.nwr.noaa.gov/ > click on publications then click on Federal Register Notices by Species; also at the home page, click on news releases).

The status of the Oregon Coast ESU of Chinook is listing as not warranted. We have very little data concerning non-game fish species except the longnose (Millicoma) dace, which is found in mainstem Coos as far up as Tioga Creek.

Federal, state or Bureau sensitive aquatic species, other than the trout and salmon, are the Millicoma dace, the red-legged frog, and the torrent salamander. Potentially occurring species include the tailed frog and torrent salamander.

Changes before 1957: The first settlers in the South Fork Coos came in 1854. These people did the initial land clearing for agriculture and lived under isolated conditions. They relied on rowboats carried by the tides to deliver their produce to Empire City and to pick up supplies. Steamboat access began in 1884. The pioneers that settled between 1884 and 1900 developed the dairy industry along Coos River. By the 1900s, the settlers were draining the land with a system developed by the Dutch. They hand dug and lined the ditches with 2X12 cedar planks. The ditch box was covered with a rough split plank. The ditch box terminated with a tide gate at the river (Mahaffy 1965).

Between 1890 and 1917 the Army Corp of Engineers removed 8,600 trees and blasted 1750 boulders from the lower 22 miles of the Coos River System (Maser & Sedell 1994). The Corp did this to improve navigation and splash dam logging opportunities. Maser combined data from the mainstem Coos, Coquille and Tillamook Rivers and estimated that these rivers contained an average of 336 trees per stream mile (21 per 100 meters). In 1906, The Corp of Engineer's snag boat cleared the South Fork Coos from the confluence with the Millicoma up river for 6 miles (Annual Report of the Chief of Engineers referred to by Mahaffy 1965). Coos River's, instream logs averaged greater than 4-feet diameter and the river mainstem below Tioga Creek had "rocky stream beds"(Beckham 1990).

In the 1880's the readily accessible harvestable timber around Coos Bay was exhausted resulting in logging operations moving into the South Fork Coos (Beckham 1990). Two periods of intensive logging took place along the South Fork Coos between 1900 through 1910 and again from 1934 through 1957. The primary methods for moving logs to the mill were log drives during freshets and splash damming. Four splash dams were constructed on the South Fork Coos River. Two failed shortly after construction. The other two were the Lower Dam, built in 1942 at11 miles above the head of tide, and the Tioga Dam, built in 1943 and located a mile downstream from Tioga Creek (See Figures 1, 2 and 3 in the Human Use Chapter). For 17 years, these two dams operated efficiently in moving the logs downstream. In the process they were also responsible for the lack of instream habitat, which occurs to this day. Splash dam operations caused loss of instream habitats, altered riparian vegetation and contributed to extensive bank erosion along the mainstem South Fork Coos. A 1959 report noted that during the years the splash dams operated, no chinook were observed spawning beyond the 9.0 mile point above Dellwood (copy of report on file Coos Bay District Office).

The South Fork Coos was a major producer of salmon. The Coos River Fish Hatchery at the mouth of Salmon Creek, 18-miles upstream from Coos Bay, used this resource to obtain eggs for their operation. The hatchery operators caught fish in traps in racks across the South Fork Coos River below the mouth of Salmon Creek and across salmon Creek at the hatchery The racks were generally effective in stopping salmon. However, high flows over topped the racks allowing fish to escape and proceed up stream. The hatchery operated from 1897 to October 1961, and produced more than 100,000,000 fish. Hatchery managers were concerned about the construction of the Lower and Tioga dams, and by 1950 and 1952 respectively, fish ladders had been built to bypass the dams. Public concern for bank erosion, property damage, the closure of the river to navigation due to large numbers of in-river logs and damage to fish runs eventually forced the shutdown of both dams by 1957 (Beckham 1990).

Most roads in the forested part of the Watershed were built after 1943. Before that time, few roads, outside of agricultural areas, constrained stream channels or constrained the streams' access to their flood plains.

Reference Conditions:

Early fish catch numbers: The tables below presents the annual commercial gill net catch in pounds for Coos Bay and Coos River for an 8-year period beginning in 1923, and for the last 5 years of the commercial gill net fishing, which ended after 1946. Table Fish-4 shows the estimated numbers of fish caught annually by gill net and the assumptions used to calculate those numbers.

Table Fish-2: Coos Bay and Coos River Gill Net Catch in Pounds of Fish by Species for the Years 1923 Through 1930

Year	Chinook	Coho	Steelhead	Chum
1923	266,799	301,081	85,660	no landings recorded before 1928
1924	356,565	513,050	103,232	
1925	292,183	577,156	70,794	
1926	133,193	200,783	80,168	
1927	99,147	297,339	29,016	
1928	184,678		47,957	5,894
1929	68,655		26,910	272
1930	51,775		61,293	1,962

Table Fish-3: Coos Bay and Coos River Gill Net Catch in Pounds of Fish by Species for the Years 1942 Through 1946

Year	Chinook	Coho	Steelhead	Chum
1942	4,372	17,266	1,816	389
1943	2,656	32,585	467	14
1944	28	6,834	2,427	25
1945	60	8,278	392	7
1946	893	4,162	890	----

Table Fish-4: Estimated Average Annual Number of Fish Caught by Gill Net in Coos Bay/ Coos River in 1923 through 1925

Species	Chinook	Coho	Steelhead
average annual catch for 1923 through 1925	305,182 pounds	483,762 pounds	86,562 pounds
estimated weigh for an average fish	10 to 15 pounds	8 pounds	8 pounds
estimated average annual number of fish caught from 1923 to 1925	~30,500 to 20,300	~60,500	~10,800

Table Fish-5 shows how the gill net fishery declined until it was eliminated after 1946. No data is available to provide historical estimates of sea-run, fluvial, or resident cutthroat trout in the Watershed. Early interviews with tribal members indicated that the chum salmon was an important of their catch at the fish trap at Crawford Point on the old Coos River Channel. The abundance of chum salmon was never recorded before their populations began to decline.

Table Fish-5: Changes in Pounds of Fish Caught with Gill Nets in Coos Bay/ Coos River Thorough Time

Species	Chinook	Coho	Steelhead	Chum
The last year the catch exceeded 100,000 lbs.	1931 (105,407 lbs)	1935 (202,402 lbs)	1924 (103,232 lbs)	---- ----
The last year the catch exceeded 10,000 lbs	1939 (15,280 lbs)	1943 (32,585 lbs)	1939 10,664 lbs)	---- ----
The last year the catch exceed 1,000 lbs	1943 (2,656 lbs)	---- ----	1944 (2,427 lbs)	1937 (1,365 lbs)

Fish habitat conditions: The several upper reaches of Tioga Creek provide a pre-management reference for the 5th order and smaller streams in the Watershed. These reaches contain frequent log jams, some boulder fields, and flood plains that are not constrained by a road nor has the stream channel cleaned of

wood. The larger order channels meander through the alluvial sediments. This, in combination with large diameter and long-in-length instream wood, creates a variety of complex habitats and provides large substrate retention areas. The mostly intact riparian areas have continued to contribute wood to the stream over time. Before the start of intensive management, the conditions like those found on Tioga Creek's upper reaches existed in much of the Watershed.

The "Tioga Appendix : Upper Tioga Creek Stream & CWD Diagram" section contains maps of the channel and instream structures on a 5th order reach of Tioga Creek in 1995. The "Tioga Appendix: In Stream Gravel & Coarse Woody Debris" contains excerpts and summarizes the condition of in stream wood and channel substrates for the South Fork Coos River in 1954 and 1959, and for Tioga Creek in 1953, 1954 and 1955.

Before timber harvest activities began, the amounts of down large wood within 200' of the stream were likely very high in most of the Watershed[2]. Ursitti (1990) found 3,600 to 9,400 cubic feet of CWD/ acre in intact streamside old-growth stands. This volume includes all wood 4-inches in diameter by 1-meter long and larger.

Synthesis and Interpretation

The flood plains and wetlands along the main stem and major tributary streams in this Watershed are important habitats for many aquatic organisms. These areas provide low water velocities and are high in nutrients resulting in lower expenditures of energy and a large availability of food. The potential for maximum growth is much higher in these reaches when compared with the upper reaches of the Watershed.

Diking, draining and conversion of the wet lands flood plains low in the Watershed to agriculture have reduced the access to and area in these habitats. In the forested parts of the Watershed, road construction next to C channel streams have reduced flood plain area and confined streams. Removal of wood from C channels streams has reduced channel complexity. This reduces both aquatic habitat complexity and the streams' ability to dissipate energy. The importance of energy dissipation on channel morphology is covered in the Stream Channels chapter.

The development of large earthmoving equipment and log trucks made the transport of logs by road a much simpler task. The early road construction generally occurred next to stream channels as gradients were low. Through the process of construction, sidecast material was often pushed into flood plains or directly into the rivers and large trees were removed from the excavation zone. Road construction and maintenance have impacted aquatic systems primarily through channel constrainment, the creation of passage barriers for upstream aquatic organism migration, and the loss of riparian/instream wood and substrate. The 13 miles of roads within 200' of streams on BLM lands continue to prevent certain instream habitat development and riparian recovery. Constrained stream channels maintain higher water velocities, potentially causing bank instability, and loss of slow water habitats during flood flows. As a result, aquatic organisms dependent on those habitats have experienced reduced survival. Road side salvage of blow down and hazard tree removal impacts those riparian dependent species reliant on large woody habitat components. Several of the 116 stream crossing culverts on BLM lands are undersized and/or do not provide upstream passage for many aquatic organisms. These barriers continue to prevent habitat connectivity, the exchange of genetic material within species and access to refuge habitats. Of the landslides that occurred during the 1996 floods, several delivered fine sediments to the stream channel but left behind large wood and coarse sediment accumulations on top of roads. Before the

[2] Areas burned by frequent repeated fire were exceptions. Repeated fires would have consumed wood already on the ground and killed young trees on those sites before they grow to large enough to supply large wood to the streams or streamside forest floor (Swanson & Lienkaemper 1978).

construction of roads, this material would have moved downstream and would have developed into instream and riparian habitat.

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